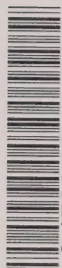


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Canada. Statistics
Highway construction price
index (revised).

1956-66

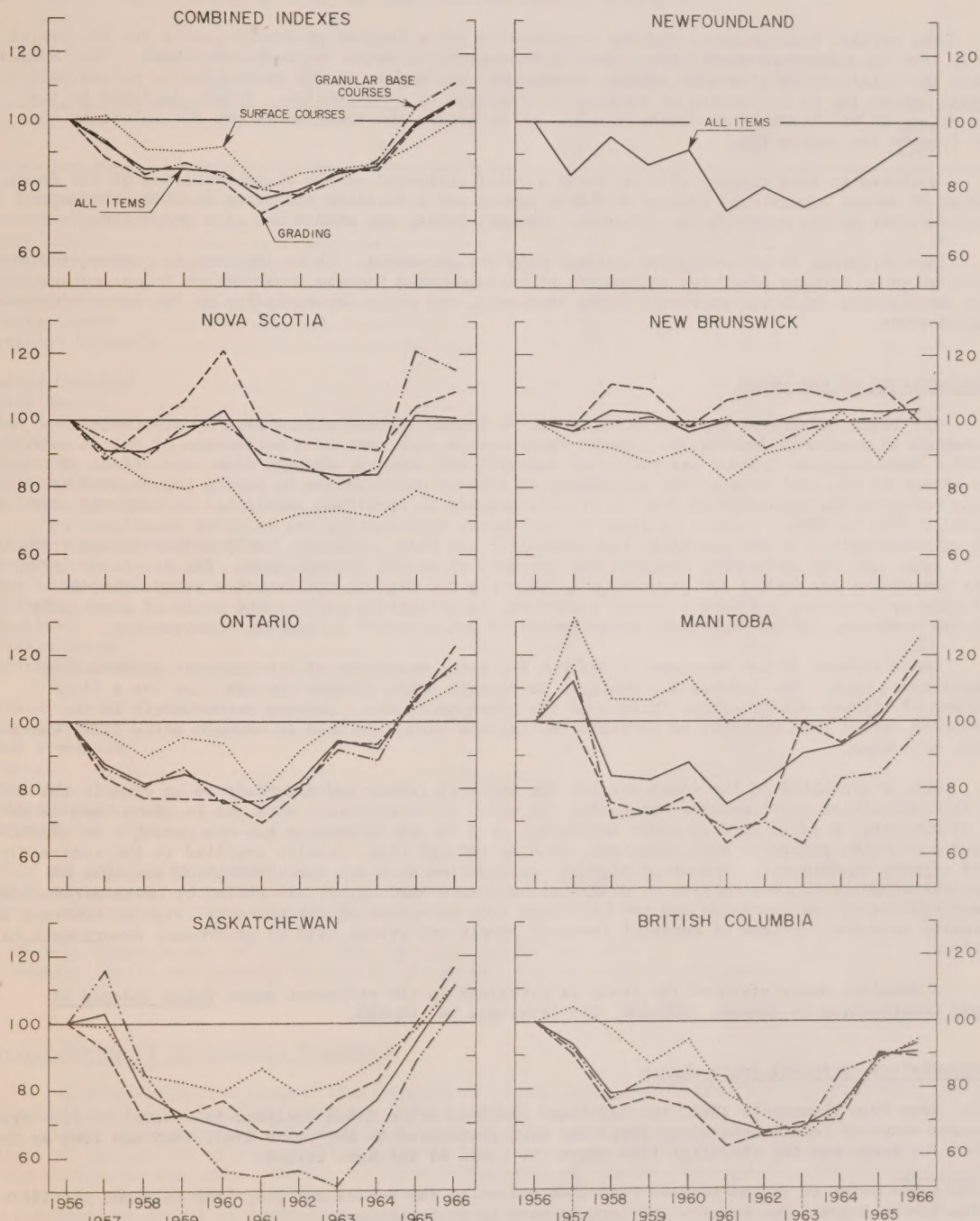


Highway Construction Price Index (REVISED)



CHART-1

REVISED BASE-WEIGHTED HIGHWAY CONSTRUCTION PRICE INDEXES, ALL ITEMS AND MAJOR COMPONENTS.
COMBINED AND PROVINCE INDEXES
ANNUALLY 1956-1966⁽¹⁾
1956 = 100



(1) Years refer to fiscal year, eg. 1966 refers to the period April 1, 1966 to March 31, 1967

REVISED BASE-WEIGHTED HIGHWAY CONSTRUCTION PRICE INDEXES, ALL ITEMS AND MAJOR COMPONENTS

COMBINED AND PROVINCIAL INDEXES, ANNUALLY, 1956-1966(1)

1956=100

The revised base-weighted highway construction price indexes presented herein for the period 1956 to 1966 include seven provincial indexes and aggregate indexes for these provinces. The indexes express the relationship of prices highway departments are paying in any given year to prices paid in the base period for an unchanging or equivalent programme of construction. Prices included in the index relate to bid items of contracts awarded and to prices the departments pay for materials supplied free to the contractor.

Included in this summary will be found a brief statement of the characteristics of the index, a review of recent significant changes in index levels and a detailed statement in which the major characteristics of the revision are reviewed. Summary tables and charts are also presented.

Data relating to base-weighted indexes only are presented. It is intended to prepare revised current-weighted indexes after the completion of base-weighted Highway Construction Price Indexes for Quebec and Alberta which are currently being developed, and their incorporation in the base-weighted combined index.

Characteristics of the Index

The Price Indexes of Highway Construction in Canada express prices paid by provincial governments in contracts awarded for highway construction each year as a percentage of prices paid in 1956. Base-weighted indexes are published annually and measure, through time, the effect of price change on the cost of specific programmes of highway construction in Canada represented by highway construction contracts of \$50,000 or more awarded by specified provincial governments over the period 1956 to 1966. Weights of items in the index, representing the relative importance of units of construction in the specified base-period(2) are held constant. Only prices change from year to year, and the index thus measures the movement of prices through time. The all-items index or its components are useful for planning and budgeting for highway construction programmes, in escalating or up-dating previously costed road-work, in estimating replacement costs of previously completed roadwork, and as historical measurements of price trends in highway construction.

These indexes do not necessarily reflect the price movements of non-contract construction or maintenance work. The indexes are designed to measure price changes through time for a fixed programme of highway construction, in each of the seven provinces. Because price levels in the base-period varied from province to province the indexes cannot be used to compare price differences between provinces.

Prices contained in the index are not for units of labour and materials as is usually the case in construction price indexes but rather for units of construction work put in place such as an acre of clearing, a cubic yard of earth excavation or a ton of bituminous hot-mix paving. In addition, the index contains prices of some materials, such as culvert pipe, usually supplied to the contractor by the highway departments. Prices of highway construction work are annual weighted averages of bid prices of units of construction in groups of contracts awarded,(3) classified by price-determining characteristics of the contracts and the bid items such as volume of the bid item, type of contract and geographic location. Prices of material items of supply are prices paid by government departments to suppliers.

A complete description of the index is contained in the reference paper Price Indexes of Highway Construction in Canada, 1956=100, DBS Catalogue No. 62-520.

Characteristics of Recent Price Change

From 1956 through to 1961, the all-items combined price index declined to a level of 76. Price increases occurred in all subsequent years and were pronounced in the years 1963, 1965 and 1966 so that by 1966 the index was for the first time above the level of the base period.

(1) The years refer to fiscal years. Thus 1966 refers to the period April 1, 1966 to March 31, 1967.

(2) See Tables 2 and 3 for weights and periods used in each province.

(3) There may be a considerable time lag between the letting of the contract and the completion of the job.

As shown in the following table, sharp increases in capital formation in each of the years 1964, 1965 and 1966 were generally accompanied by rising prices paid by provincial highway departments to contractors and to manufacturers providing construction materials to the departments. Increases in the all-items combined index varied from under 3 per cent in 1964 to about 15 per cent in 1965 and 7 per cent in 1966. Increases in granular base courses tended to be stronger than increases shown by the grading components. Surface courses registered the smallest gains on the average. By province, some of the strongest price changes occurred in British Columbia and Saskatchewan. Prices were most stable in the New Brunswick grading and granular base course indexes.

Percentage Changes in Revised Price Indexes of Highway Construction
and Related Public and Private Investment, 1964, 1965 and 1966

	1964 1963	1965 1964	1966 1965
All Items Combined	+ 2.6	+ 15.4	+ 7.0
Newfoundland	+ 7.7	+ 10.3	+ 8.5
Nova Scotia	+ .6	+ 21.2	- .8
New Brunswick	+ 1.5	- .5	+ .4
Ontario	- 2.2	+ 16.4	+ 9.3
Manitoba	+ 2.9	+ 7.8	+ 14.7
Saskatchewan	+ 13.7	+ 23.6	+ 16.4
British Columbia	+ 9.5	+ 20.4	+ 1.5
Grading Combined	+ .4	+ 15.8	+ 7.2
Nova Scotia	- 1.3	+ 14.2	+ 4.2
New Brunswick	- 3.0	+ 4.3	- 9.5
Ontario	- .9	+ 14.5	+ 15.0
Manitoba	- 6.3	+ 9.2	+ 15.5
Saskatchewan	+ 7.4	+ 20.7	+ 16.7
British Columbia	+ 1.4	+ 28.3	- .9
Granular Base Courses Combined	+ 5.9	+ 19.7	+ 6.7
Nova Scotia	+ 6.3	+ 39.6	- 4.1
New Brunswick	+ 3.1	+ .6	+ 6.5
Ontario	- 3.4	+ 23.2	+ 6.2
Manitoba	+ 31.0	+ 2.0	+ 14.4
Saskatchewan	+ 27.5	+ 35.0	+ 17.8
British Columbia	+ 27.4	+ 5.7	+ 4.1
Surface Courses Combined	+ 2.3	+ 7.1	+ 7.2
Nova Scotia	- 2.6	+ 10.7	- 4.8
New Brunswick	+ 11.2	- 14.6	+ 17.4
Ontario	- 2.2	+ 6.9	+ 5.9
Manitoba	+ 3.7	+ 9.4	+ 13.7
Saskatchewan	+ 8.5	+ 10.9	+ 12.8
British Columbia	+ 12.7	+ 18.9	+ 7.1
Public and private investment			
Road, highway and aerodrome construction(1)	+ 19.0	+ 9.1	+ 14.8
Total public and private investment(2)	+ 16.5	+ 17.6	+ 15.8

(1) Source: Construction in Canada, DBS Catalogue 64-201 (Annual).

(2) Source: Public and Private Investment in Canada, DBS Catalogue 61-206 (Annual)

Characteristics of the Revision Programme

In considering the general characteristics of the index and of the revision programme, it is important to consider problems which are met in pricing construction goods. The purpose of such indexes is to provide measurement of changes in price for highway construction put in place. The problem central to the pricing of construction goods is the lack of standardization in these goods from one period of time to the next. Because of the heterogeneity of construction goods, statisticians must make certain compromises in the development of price indexes which may be used to measure price changes for construction output of unchanging quantity and quality - an implicit standard construction product.

In most instances, it is necessary to fall back on the pricing of inputs as a proxy measure of the movement of prices of the finished product. In the case of the highway price indexes, however, the use of bid prices in contracts awarded for standard units of work should give, conceptually, a close approximation to the desired finished product pricing.

The original description of the analysis of highway contract data is still valid and for greater detail one may refer to DBS Occasional Paper 62-520: Price Indexes of Highway Construction in Canada. The revision programme reflects improvements which have accrued from greater knowledge and skill in the interpretation and use of these data and also the incorporation of some new data which were not available when the original indexes were prepared, rather than the adoption of new methodology. Indeed, production of the indexes was suspended following 1963, pending completion of the revision. These improvements resulted in the conclusion that some of the original data should not be retained in the revised index. The most significant exclusion is that relating to the Federal Government Index which is no longer calculated. (This exclusion is discussed in greater detail below).

When a price index maker is dealing with a mass-produced item which is sold in great volume it is relatively easy to select identical transactions in successive time periods. From an aggregation of such numbers one can make statements about price changes between successive time periods with a fair degree of confidence. In highway construction it is necessary to acknowledge that identical transactions even at the contract item level do not occur in successive time periods. Some analysts of bid prices stop at this point and recognize that they are preparing unit cost indexes. However the bid classification systems adopted in DBS are considered to be sufficiently reliable that one is able to say that the indexes are not unit cost indexes and therefore primarily measure price change. However, the relatively small numbers of contracts let in each province and the shifts in the road construction programme which occur from time to time within a province force one to acknowledge that the indexes do not have the strength of some of the more conventional price indexes relating to sales of manufacturers goods or purchases of consumer goods. Perhaps the most accurate description is to term the highway price index a finely-controlled unit cost index. The principal refinements of the revised indexes can be described as follows:

1. The main advance has come in the form of a more highly developed concept as to what constitutes a reliable price. Three factors are always considered in making this judgement for any given price relative: the number of bids, the variation of the bids about the average, and the sensibility of any given index number or set of average prices to other indexes and prices to which it is logically related, in terms of both price movement and price level. Almost without exception if an index has been created from 10 or more bids in each year where the variation of the bids about the average is narrow and where uniform price level and movement relationships are maintained with other items, the resulting price is regarded as being reliable. One of the characteristics of such a number is that it does not usually exhibit erratic price movements. If it does, it is possible to establish a cause of the unusual behaviour. On the basis of such criteria it was found that many of the items representing a relatively small proportion of the value of the contract which had been included in the original index, were unreliable and as is outlined in detail given below, these items were excluded from the revised index. Other items not conforming to the criteria established were also excluded for reasons which are specified in the statements describing the revisions made to the province indexes.

2. Definitions of price strata were realigned in many cases - either to recognize the existence of varieties of work which exhibited different price levels which were not seen during the original analysis or to adjust quantity intervals to limits which encompassed the largest number of bids with the least loss in homogeneity, or to reflect the incorporation of new data.

3. A satisfactory procedure has been established to deal with unbalanced bids whereby such bids are identified and removed from all the averages affected.

4. In many instances it was found more reliable to use manufacturers selling prices as substitutes for departmental purchase prices. The latter were often designated f.o.b. jobsite and it was found in some provinces that bids were not let in sufficient volume to restrict the variation caused by differing freight distances.

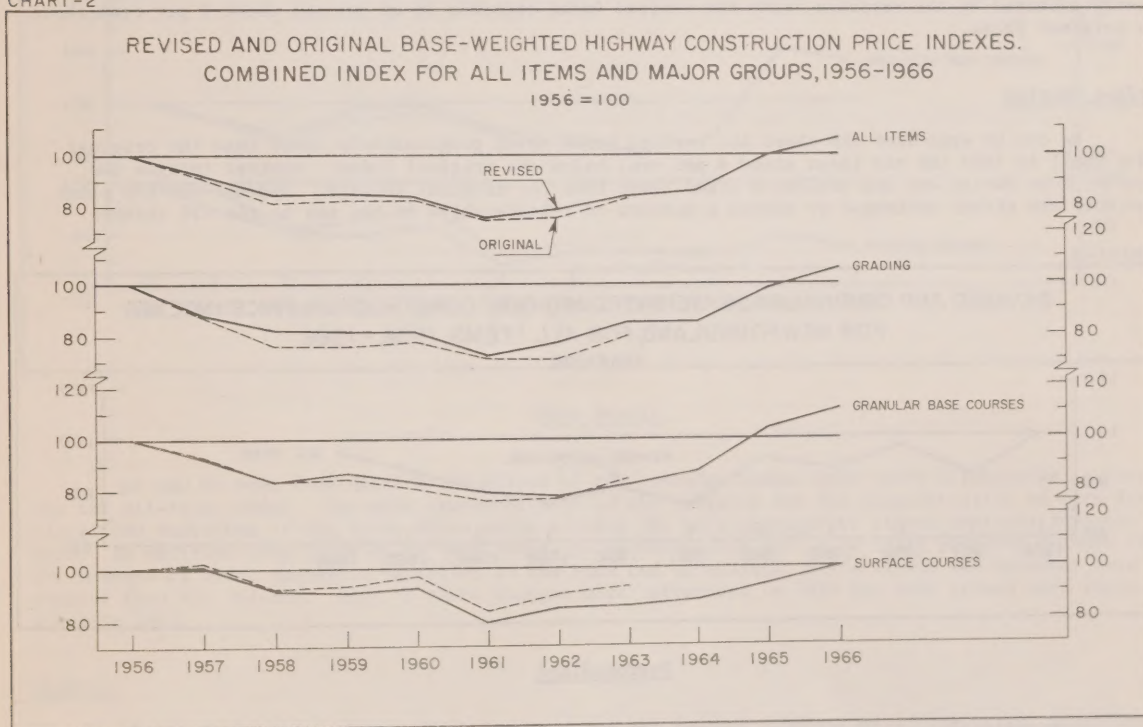
5. In many of the bid items haul of the earth, rock or gravels to the jobsite from borrow pits etc. is an implicit component of the bid. In other instances the haul cost was made an implicit component by creating a new unit price after adding in the value of haul. The reason for doing this was to capture the affect of the laid down price of the contract-item. However it was discovered that excessive quantity variations were occasionally occurring. Hence this practice was discontinued in the case of New Brunswick. It continues in British Columbia but would be discontinued if shifts in the average length of haul were observed.

Some problems remain unsolved. For example, it would be preferable to present an index relating to the contractors bid items separately from an index of departmental supply items. Because the data were not available to obtain a sample of departmental supply items and their weights, the basic structure of the indexes is unchanged although an attempt will be made when the indexes are rebased to 1971=100 to accomplish this change. In addition, resources were not expended currently to re-examining the inputs of culvert pipe and asphalt into a current construction programme. The weights used currently for asphalt are probably reliable but it is not known how reliable the pipe weights are.

Because of an inability to significantly improve the weighting pattern during this revision it was decided to make only those changes which were necessary to incorporate new data or accommodate other revision changes. An example of major weight revisions is the exclusion of the Federal Government Index from the revised index. This change is illustrated in Table 2. In addition changes in the Ontario weighting pattern were made to eliminate some of the differences between DBS and Ontario Department of Highways index aggregation procedures. Other changes are described in more detail in the next section and in Table 3. In making the weight changes the relevant expenditure patterns were converted to 1956 price levels. In instances where weighting patterns were unchanged it was judged that current expenditure patterns were similar to original expenditure patterns.

Before proceeding to the detailed description of the revision programme which follows it is appropriate to pay tribute to the large contribution made by the provincial highway departments in the creation of these index numbers. Without their comments on the validity of the classification systems, the resulting price movement and the probable causes of erratic behaviour encountered from time to time in the individual bid items it would not be possible to create an estimate of a price index for this statistically difficult area.

CHART-2



Combined Index

The revised and original combined all-items index is presented in Chart 2. As can be seen from the chart the two indexes follow a similar trend but the revised index lies consistently above the original index. The greatest differences occurred in 1958, 1959 and 1962 when the revised index stood between 4 or 5 per cent above the original index. For the other years (excluding the base year) the revised index stood 2 per cent or less above the original index.

The main characteristic of the revision, at this level, is the removal of the Federal Government index from the combined index, with the result that it was necessary to adjust the index weighting pattern. The present weights represent expenditure patterns for 1964 and 1965 at the province level. At the group level the Ontario weighting pattern reflects patterns of expenditure existing in 1964. The British Columbia weighting pattern also relates to 1964. The earlier pattern was heavily influenced by Trans-Canada Highway work and did not relate to more typical patterns which existed in later years. For all other provinces, the group weights used in the original index were similar to current expenditure patterns. Details of weight changes within major groups are outlined in the discussion of detailed changes given below. In summary the new weights relate to expenditure patterns prevailing or similar to those prevailing in 1964 or 1964 and 1965 expressed in 1956 prices. The time base of 1956=100 is retained unchanged. There have also been revisions to the price relatives from which the indexes are derived. These changes are outlined in detail for each province, below. The affect of these revisions has been substantial for New Brunswick, Manitoba and British Columbia.

Grading

The revised index lies higher than the original index mainly because of the influence of upward changes in the Nova Scotia and British Columbia grading indexes. In addition the Federal Government index which was removed from the index stood at a much lower level than that shown for the combined index of grading. In most years the difference in levels averaged about 5 per cent.

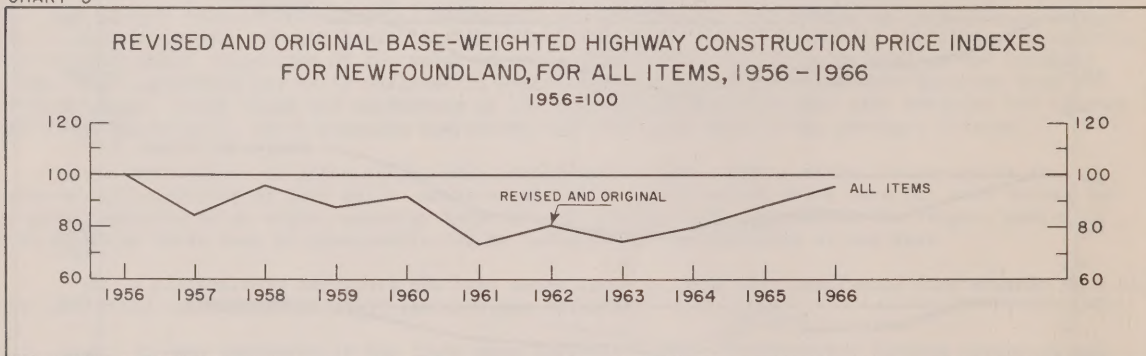
Granular Base Courses

The revised and original granular base course indexes at the combined index level were not greatly affected by the revision, with the revised index standing on an average about 2 per cent above the original index.

Surface Courses

As can be seen from the chart the revised index moved progressively lower than the original index until in 1963 the new index stood 8 per cent below the original index. Revised indexes for Ontario, Nova Scotia and New Brunswick stand lower than the original indexes. Indexes for the other provinces are either unchanged or showed a mixture of relationships of the new to the old indexes.

CHART-3



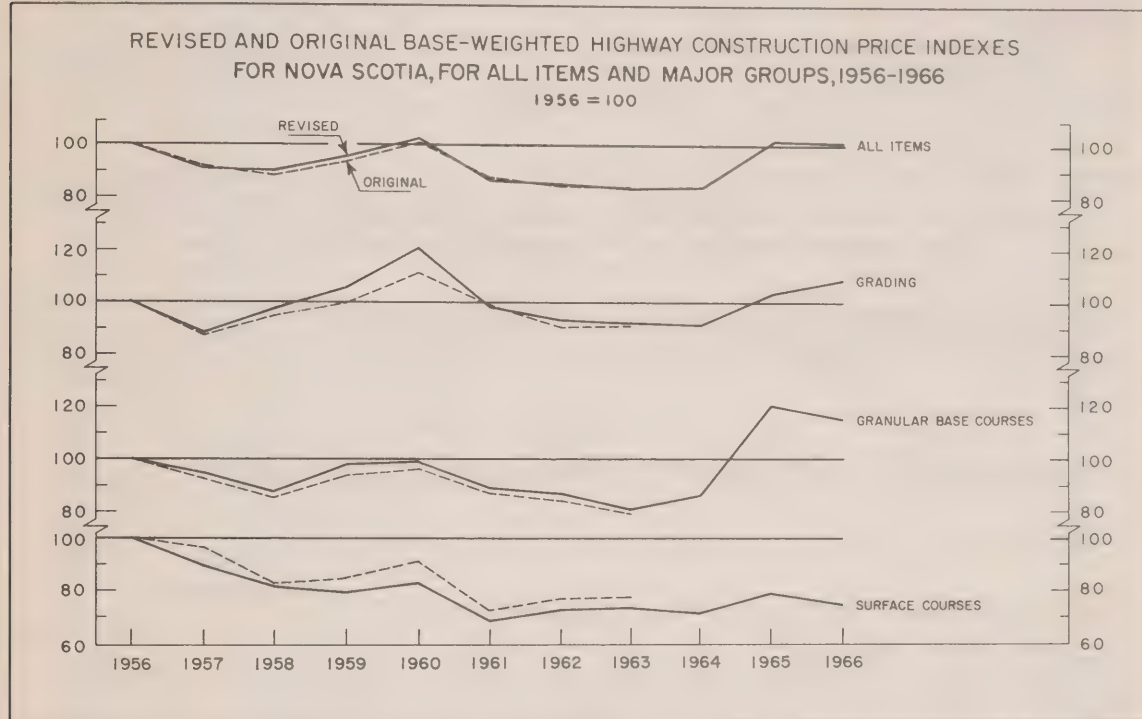
Newfoundland

A relatively small number of contracts was let in Newfoundland during a period of rapid change in the entire road construction industry. No classification problems were devised to handle these changes in a satisfactory way and the major decision to be made during the revision was whether or not the index should continue to be published. It was decided to continue publishing at the all-items level but users are warned that the index should be regarded as a unit cost index, reflecting inextricable mixtures of changes in quantity and price.

In 1963 a number of changes in index classification were made and introduced into the index. The important changes are listed below:

earth excavation: the two index items were replaced by one with altered quantity limits;
 rock excavation: the low quantity item was dropped from the index;
 pitrun gravels: this item was excluded as an index item and its weight imputed to crushed gravels;
 crushed gravels: the all-varieties low and high quantity index items were replaced by the Gravel A and B all-quantities items;
 placing bituminous hot-mix: the low and high quantity items were replaced by an all-quantities item.

CHART-4



Nova Scotia

As can be seen from Chart 4 the effect of the revision caused only minor differences in levels for the all-items index. The main characteristic of the revision was the identification of more finely-classified varieties of bid items which could replace the more aggregative classifications formerly used. In addition some items which were judged to be unreliable for price index purposes because of low numbers of bids, excessive variation in the bids and unrealistic price levels and movement were removed from the indexes. Some of these changes were introduced in 1956 but most others were introduced in 1963.

Grading

The most important change which occurred was the further subdivision of the earth excavation on grading contracts into common and borrow excavation. This change effected the index from 1956 forward. The low quantity rock excavation item was excluded from 56 forward on the basis of unreasonable price levels and the small numbers of bids. Some minor items such as clearing on other than grading contracts and grubbing on other than grading contracts, were removed from the index effective 1963, but other minor items were either retained unchanged or were subject to minor corrections. Differences in index levels were greatest in 1959 and 1960 when the levels were 6 per cent and 9 per cent from one another as can be seen on Chart 4.

Granular Base Courses

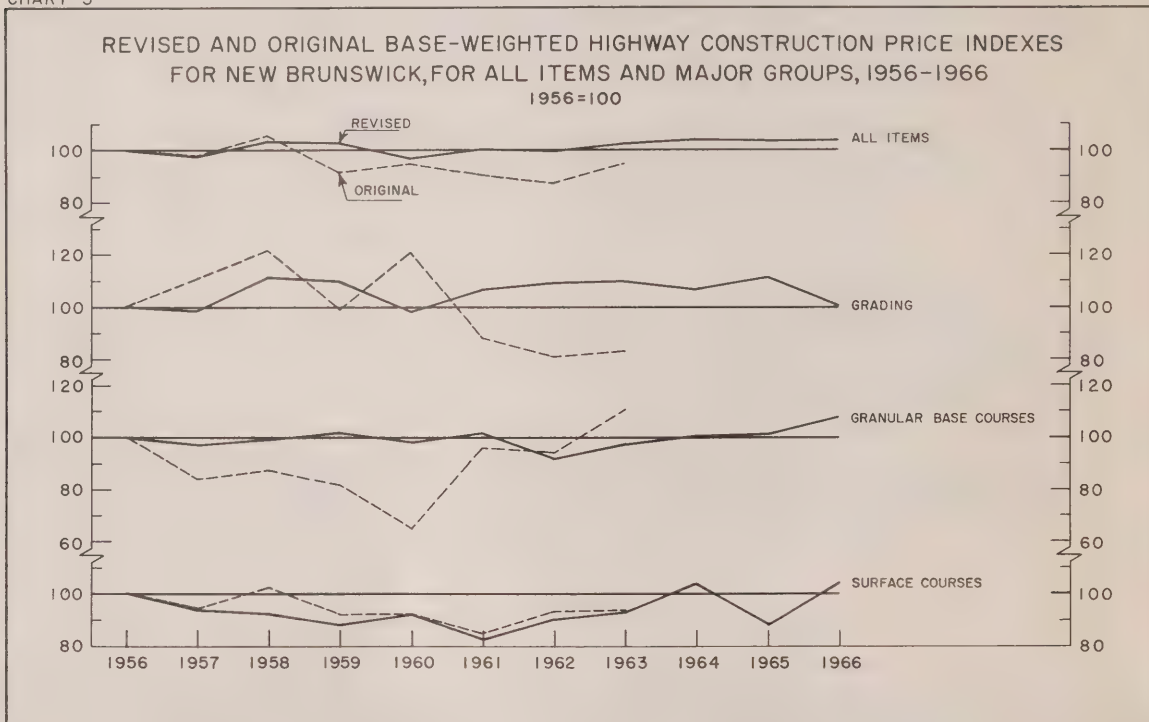
In the revision the low and high quantity pit run materials items were excluded leaving only the medium quantity item in the index. In 1960 the quantity limits were changed from 20,000 - 74,999 tons to 10,000 - 74,999. In 1964 a variety, Class E Gravel Borrow replaced the former all varieties item.

For crushed gravels the unclassified gravels index items were replaced by three varieties, Class A and Class B and Base Course in 1956 and Class C which replaced Base Course in 1964.

Surface Courses

In the revision the high quantity placing bitumous hot-mix item was excluded from the index because of insufficient numbers of contracts from 1956 to 1962. In 1962 a Class B paving item was introduced into the index and in 1963 a Class C was introduced into the index.

CHART-5



New Brunswick

Because of the inclusion of some new data which caused a different classification system to be adopted for four major index items the revised New Brunswick index is substantially different from the original index particularly in 1959 and for the years 1961 to 1963. An analysis of the new data showed that when haul was included as an implicit component of price that variations in the importance of haul occurring in successive time periods rendered the bids not comparable. As haul rates are fixed by the department, a series of haul-rate prices has been constructed and introduced into the index. As a result, earth, borrow, rock, and the granular materials now enter the index without haul included as an implicit component.

Grading

Some minor items were retained in the revised index unchanged from the original index: clearing, grubbing, and placing creosoted timber culverts. Decisions to include or exclude were made mainly on the basis of number of bids, and amount of variation in the bids.

The major items were completely revised. After analyzing new data submitted by the department for earth excavation it became clear that the year to year shifts in the characteristics of contracts with respect to haul was such that the bids in successive years could not be considered comparable. Thus our practice of making haul expenditure an implicit component of the earth price was discontinued and haul was introduced as a separate index item. Departmental rates for haul were selected to obtain a measure of price movement and weights were estimated from a 10 year average of constant dollar expenditures. Earth items currently included in the index are as follows:

- common excavation, 0-349,999 cubic yards
- haul for common excavation
- borrow excavation, 0-349,999 cubic yards
- haul for borrow excavation

Rock excavation was revised similarly and items now used in the index can be described as follows:

- rock excavation, all quantities, excluding sandstone
- haul for rock excavation

As can be seen from Chart 5 the revision caused the new index to exhibit more stable movement through time than did the original index.

Granular Base Courses

On the basis of analysis of new data submitted by the province the original items were judged to be inaccurate and new items are introduced into the revised index. Again, as outlined above for earth excavation, shifting haul distances were causing problems of comparability. Items currently used in the index are as follows:

- sub-base gravels, 0-149,999 tons, excluding sandstone
- haul for sub-base gravels
- 1 1/4" crushed gravels 0-99,999 tons where crushing expenditures are a normal proportion of total expenditure for 1 1/4" materials
- haul for 1 1/4" gravels.

Again the effect of the revision was to produce an index which exhibited smoother, more stable price behaviour.

Surface Courses

As can be seen from the charts the effects of the revision were minor. The analysis of haul for successive years indicated the prices including haul could be retained in the index. However the high-quantity item, 30,000 tons and over, was excluded because too few bids of that type occurred. Minor changes were made to the asphalt supply series.

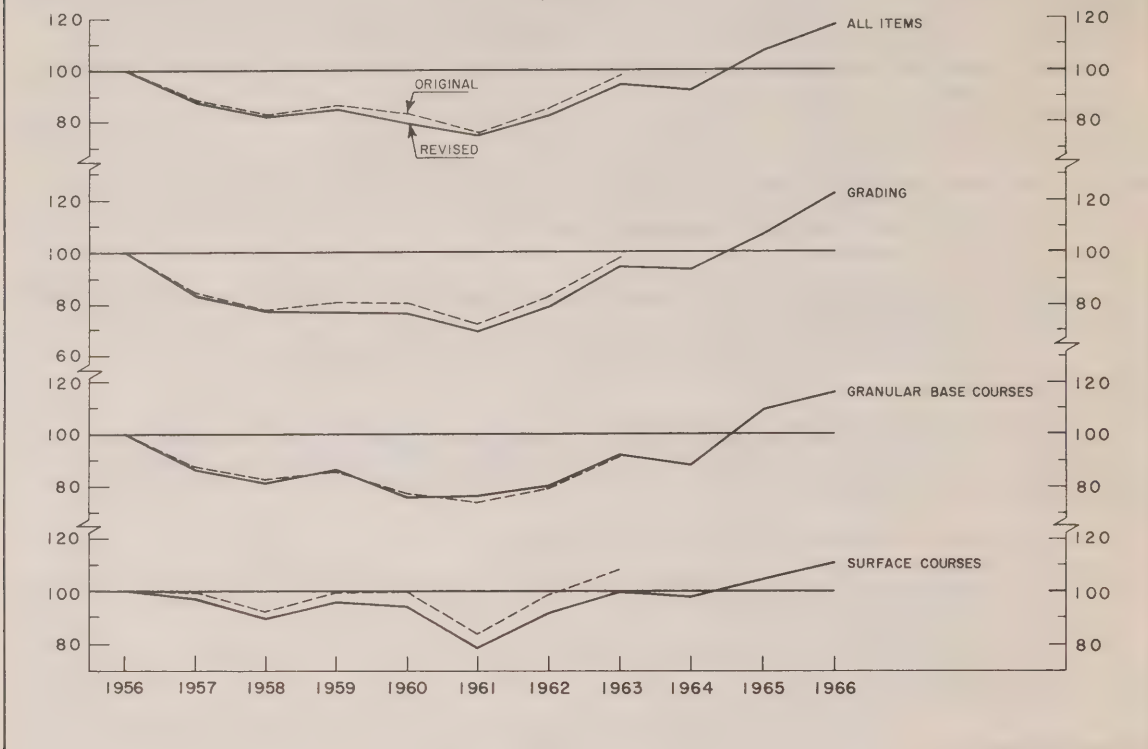
Ontario

For a number of years the Department of Highways for Ontario and DBS were separately calculating a bid price index for highway construction. In 1964 separate tabulations ceased and it was agreed that resources released through the elimination of duplicated effort in the Department of Highways would be diverted to more analysis of the contract data. The index from 1964 forward is based on prices yielded by this enlarged Ontario programme. As a result of increased analysis, bid prices are now tabulated separately for five regions within the province. Until a longer history of price behaviour is accumulated, the regional price relatives selected for inclusion in the index are given equal weights in the derivation of an item index. For the period 1956 to 1964, some historical Ontario data and systems of classification were adopted for inclusion in the DBS index.

Changes in the characteristics of the department's capital programme necessitated the introduction of a new weighting pattern. As will be seen from the accompanying tables substantial shifts have occurred in group weights. These weights are derived from the 1964 expenditure pattern expressed in 1956 constant dollars.

CHART-6

REVISED AND ORIGINAL BASE-WEIGHTED HIGHWAY CONSTRUCTION PRICE INDEXES
FOR ONTARIO, FOR ALL ITEMS AND MAJOR GROUPS, 1956-1966
1956=100



As will be seen from Chart 6 the combined effect of these two major changes caused differences in index levels which on the average were somewhat in excess of 2 per cent.

Grading

Some items in the original index were retained unchanged through to 1964: clearing, grubbing, rock excavation, and placing drainage pipe fell in this category. New price series replaced two series formerly used: departmental supply prices for corrugated metal pipe and concrete pipe f.o.b. jobsite were replaced by DBS Industry Selling Price Commodity indexes for which the terms are f.o.b. factory. Two new items were added beginning in 1956: concrete in culverts (cast-in-place culverts) and cement supply for these culverts. An ISPI price series for cement was utilized in the latter instance.

Earth excavation was reworked from 1956 forward. The original earth item had been adjusted to include expenditure for water for compaction and expenditure for machine time for compaction. As these were contractors bid items and as the province carried them as separate index items the DBS approach was altered to conform with the provincial practice. In 1964 earth was further subdivided between common and borrow and each was further subdivided into regions.

As can be seen from Chart 6 the revised index and the original index were beginning to drift apart until in 1963 the original stood 4 per cent above the revised.

Granular Base Courses

Water and machine-time indexes, (relating to compaction) which appear in the grading index are repeated in the granular base course index. (In the original index all expenditure for water for compaction and machine time was included as an implicit component of earth excavation). Indexes for granular A, granular B, and sand cushion were retained unchanged in the index until 1964 when regional

price relatives were introduced into the indexes. The 5/8" Crushed Gravels Type A and B were discontinued as index items from 1956 and the expenditure for these gravels was imputed to Granular A. Analysis of the 5/8" Crushed Gravels is continuing and they may be reintroduced as index items. As can be seen from the accompanying charts these changes caused little difference in index movement.

Surface Courses

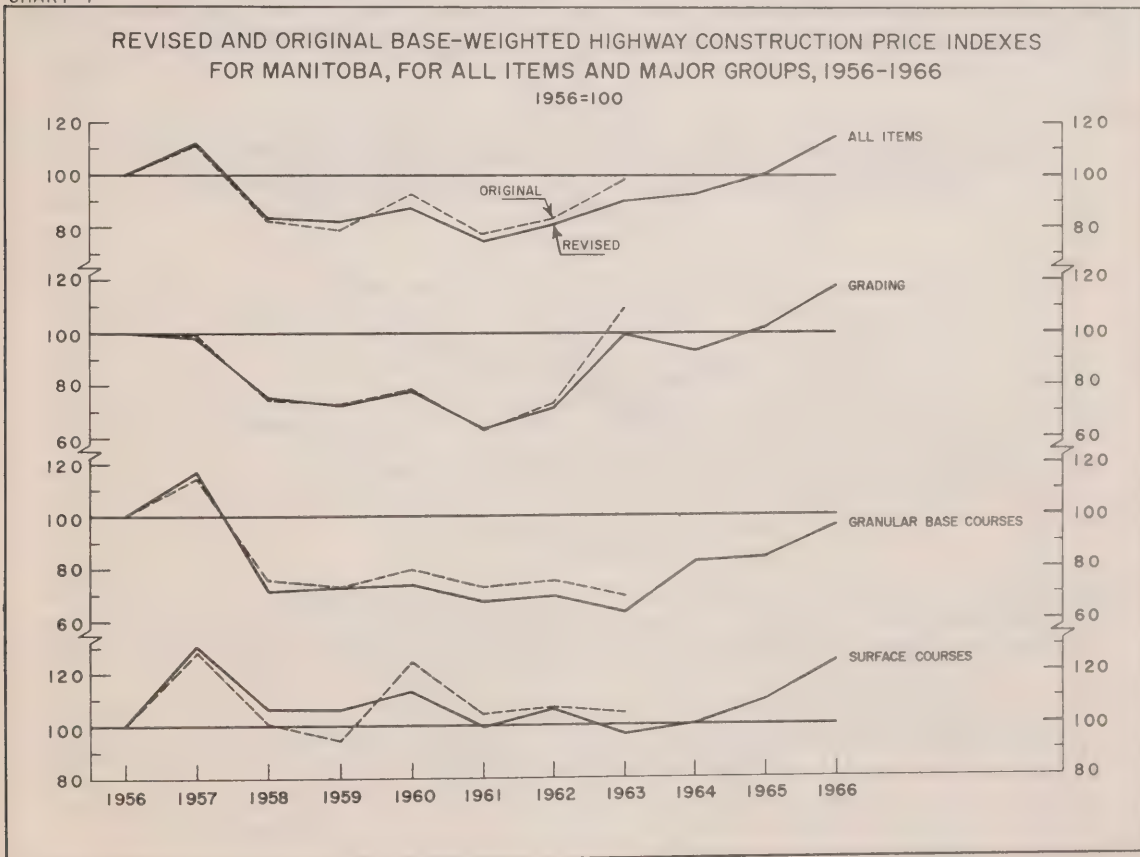
The item, placing bituminous hot-mix 8 was excluded from the revised index from 1956 forward.

Revised series submitted by the Department of Highways were incorporated into the index from 1956 to 1964 for hot-mix 1, 3, 4, 6. Regional indexes were introduced for these four varieties in 1964. The revised and original indexes were drifting apart until in 1963 the level of the original was 8 per cent above the level of the revised.

Ontario is building relatively substantial mileages of portland cement concrete pavements. However in addition to the normal, technically caused variation, which is expected, the number of bids let is small and they occur in different regions. For this reason, this type of construction has not been introduced as an index item although analysis of the bids continues. The value of this construction has been imputed to the placing bituminous hot-mix pavement index.

Cement supply for portland cement concrete pavement has been introduced as a new item from 1956 forward. An ISPI commodity index is utilized to represent price movement for departmental purchases of cement.

CHART-7



Manitoba

Revised and original all-items indexes for Manitoba are presented in Chart 7. In three years changes in levels of the two series are substantial: + and - 5 per cent in 1959 and 1960 respectively and - 9 per cent in 1963. These changes were caused by the introduction of a new classification

system. In addition, two heavily weighted prices were estimated in the revised index replacing actual averages, which on the basis of a longer history of price movement could be seen to be unreliable.

Grading

Except for 1963 the revision has not caused great changes in index level. Minor items have been removed: clearing, grubbing, clearing and grubbing, and placing culvert pipe for regions I and II. The change in level in 1963 was caused by the introduction of a new classification system.

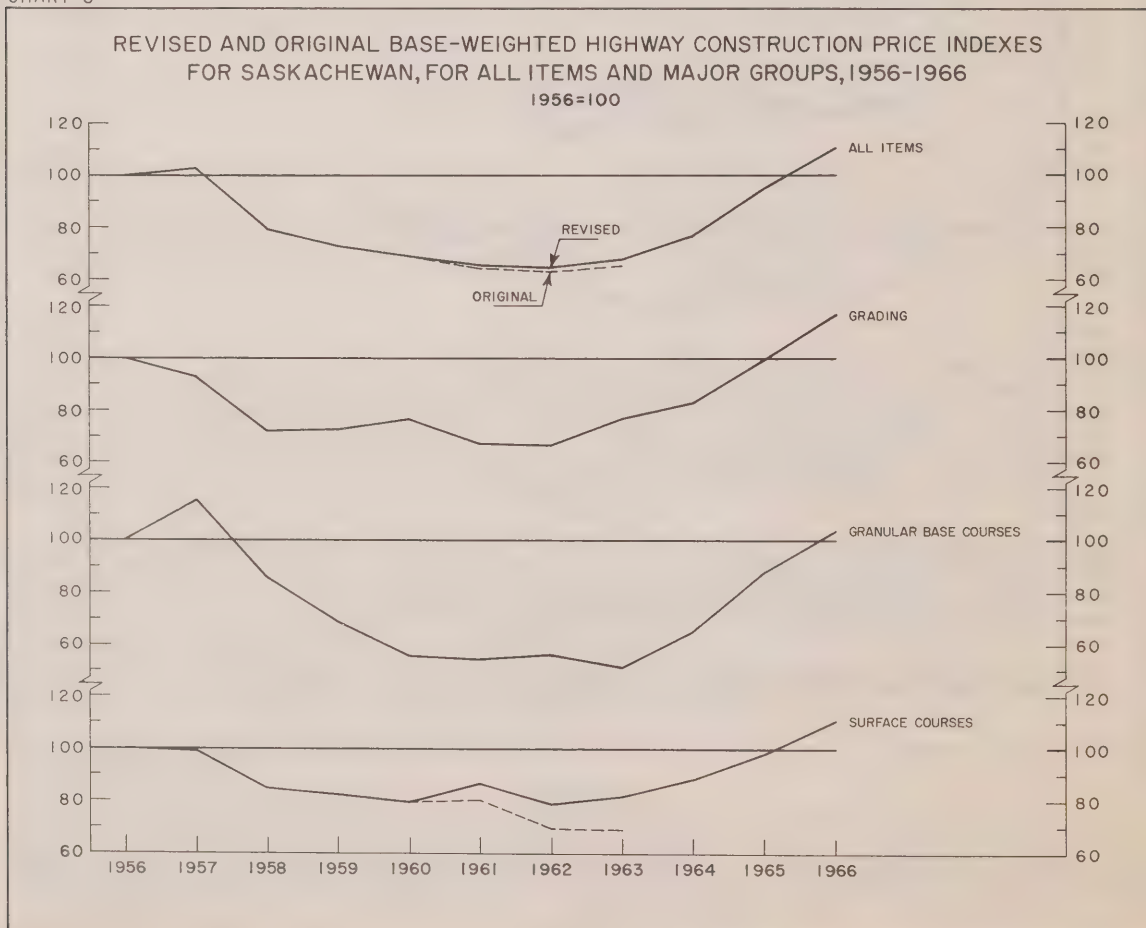
Granular Base Courses

The classification of some contract data was changed in the revision. The resulting series hold steady price level relationships in addition to similar price movement when comparing prices for the 3 areas. As can be seen from Chart 7 the effect of the upward revision was substantial particularly during the period 1960 to 1963.

Surface Courses

The supply items for asphalt and cement remained unchanged. The placing bituminous hot mix item was recalculated to correct an error in classification. The resulting price data were then evaluated and it was decided to retain only prices for Area 3 in the revised index. The placing portland cement concrete series was retained unchanged except for 1959 and 1960 when estimated prices more in line with usual price behaviour were substituted for the actual prices used originally. For three of the eight years the revised index is substantially different from the original index.

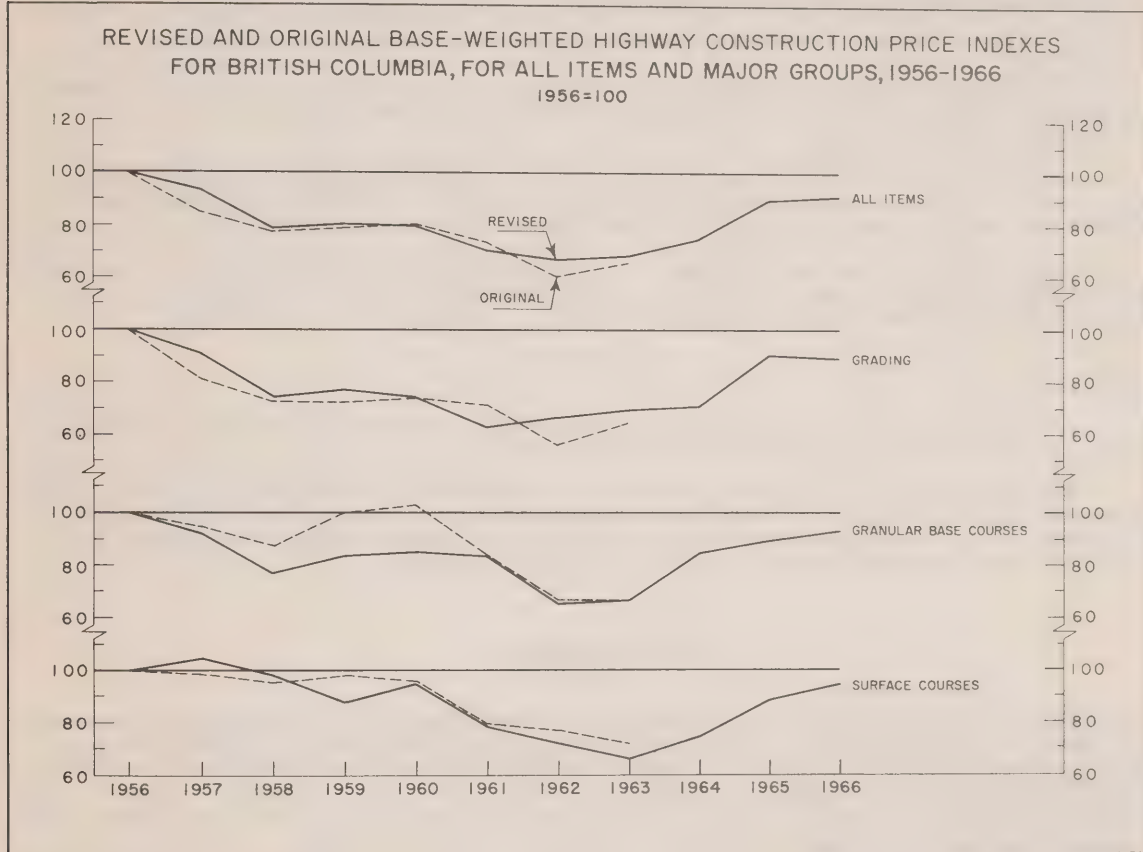
CHART-8



Saskatchewan

Revised major group and total indexes for Saskatchewan are shown on Chart 8. As can be seen the effect of the change was minor, and it arose from the revision in placing bituminous hot-mix indexes in 1960, 61 and 62. The purpose of the change was to introduce a new price basket classification at a better time. Three low value items, clearing, grubbing, and rock excavation, were removed from the index in 1964.

CHART-9



British Columbia

Revised all-item indexes are shown compared to the original series on Chart 9. The difference between the two series is within 3 1/2 per cent for four years. In the other three years the differences vary between 4 1/2 per cent and 11 per cent, the changes to the grading index being mainly responsible for the change in the all-items index level.

Because of the substantial shift in characteristics of the provinces road building, in addition to changes in assignment of some index items, it was necessary to revise group and item weights and 1964 was used as the source of the new expenditure pattern.

The effect of the revision at the group level was as follows:

Grading

Because of sharply declining numbers of bids in the category and because of the unrealistic levels of prices in relation to other related bid items it was found necessary to remove two items, viz., high quantity earth excavation and high quantity rock excavation, from the revised index. These items had a combined weight of 54.3 in the grading index. Their price movement is now imputed to low

quantity earth excavation and low quantity rock excavation from 1956 forward. Minor items such as clearing, grubbing, and placing corrugated metal pipe were also excluded. The definitions of low quantity earth and rock excavation were also made more restrictive. The variation of the bids being averaged is less extreme for these more restrictive classes than was the variation shown by bids utilized in the old classification system.

Granular Base Courses

This component has also undergone major changes. In the original index a stabilized base course item was created by combining estimated quantities of relevant qualities of gravels with the contractors bids for spraying the bitumen. A combination of low numbers, wide variation in the bids and unbalancing in the bids for the bitumen spraying created an unreliable index. Accordingly the quantities of gravels were returned to the granular base course component and new quantity intervals were selected. The new items exhibit less variation and a greater number of bids are utilized in creating the averages.

With the incorporation of the new data it was found possible to dispense with the original quantity intervals established for grading contracts. For gravels on other than grading contracts it was found necessary to change the quantity interval from 0-99,999 tons to 0-19,999 tons.

After discussions with the department it was decided that some of the bid averages for pit run materials were unreliable in the earlier years. Accordingly prices were estimated on the basis of price movement being shown for the crushed gravel items.

Surface Courses

As was explained above, the placing of stabilized base courses and its asphalt supply item were removed from the index because of inexplicable price behaviour.

The remaining items were revised as follows: a few extreme bids were edited from the placing bituminous hot-mix series upon the advice of the highway department. Asphalt prices for bituminous hot-mix paving were derived from shipments to the Vancouver area only as opposed to shipments to a much larger area in south western BC which was used in the old index.

Federal Government

When the index was developed for the Federal Government road building programme a large number of contracts were being let mostly in one region of the country. After work on the Trans-Canada Highway terminated in Western Canada it was found that road construction was occurring in insufficient volume and in such widely scattered locations that it was impossible to create meaningful price relatives from such heterogeneous data. For these reasons publication of the Federal Government index has been discontinued.

TABLE 1. Revised Base-weighted and Original Base-weighted Highway Construction Price Indexes
All-items and Major Components, Combined and Provinces, Annually, 1956-66
(1956=100)

All-items			Major components					
	Revised	Original	Grading		Granular base courses		Surface courses	
			Revised	Original	Revised	Original	Revised	Original
Combined								
1956	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1957	92.8	92.3	88.6	88.5	93.2	93.3	101.1	102.2
1958	84.4	81.4	82.2	76.8	83.4	83.4	91.1	91.7
1959	85.2	81.8	81.7	76.4	86.8	84.8	90.1	93.2
1960	84.0	82.3	81.3	78.0	82.8	80.6	92.1	97.1
1961	76.0	74.8	71.9	71.1	79.3	76.3	79.3	83.6
1962	78.8	75.9	77.4	70.5	77.4	76.8	84.2	90.0
1963	84.0	83.4	84.9	80.0	82.2	83.9	85.1	92.4
1964	86.3		85.3		87.0		87.1	
1965	99.5		98.7		104.2		93.3	
1966	106.5		105.9		111.2		100.0	
Newfoundland								
1956	100.0	100.0						
1957	84.1	84.1						
1958	95.6	95.6						
1959	87.3	87.3						
1960	91.6	91.6						
1961	73.4	73.4						
1962	80.1	80.1						
1963	74.2	74.2						
1964	80.0							
1965	88.2							
1966	95.7							
Nova Scotia								
1956	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1957	90.9	91.6	88.7	87.3	94.7	92.5	89.9	96.7
1958	90.1	88.2	97.8	94.5	88.0	85.5	81.6	82.2
1959	95.6	93.4	105.6	99.8	97.8	93.7	79.3	84.3
1960	102.9	100.7	120.7	111.0	99.0	96.7	82.4	90.5
1961	86.9	87.4	98.3	98.4	89.7	87.1	68.3	72.4
1962	85.3	84.6	93.4	90.7	87.3	84.4	72.2	76.4
1963	83.3	83.4	92.4	91.0	81.1	79.2	73.0	77.3
1964	83.8		91.2		86.2		71.1	
1965	101.6		104.1		120.3		78.7	
1966	100.8		108.5		115.3		74.9	
New Brunswick								
1956	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1957	97.2	97.8	98.6	110.7	97.2	83.8	93.6	94.1
1958	103.3	105.3	111.1	121.3	99.2	87.1	92.1	102.0
1959	102.6	91.3	109.5	99.0	101.3	81.5	88.2	91.8
1960	96.9	94.8	98.1	120.5	98.1	64.7	91.7	91.8
1961	100.1	90.2	106.4	87.8	101.2	95.9	82.4	84.8
1962	99.4	87.7	109.0	80.5	92.0	93.9	90.5	92.9
1963	102.3	94.8	109.9	82.6	97.4	110.3	93.2	93.8
1964	103.8		106.6		100.5		103.6	
1965	103.3		111.1		101.1		88.5	
1966	103.8		100.5		107.7		103.9	

TABLE 1. Revised Base-weighted and Original Base-weighted Highway Construction Price Indexes
All-items and Major Components, Combined and Provinces, Annually, 1956-66 - Concluded
(1956=100)

All-items			Major components					
	Revised	Original	Grading		Granular base courses		Surface courses	
			Revised	Original	Revised	Original	Revised	Original
Ontario								
1956	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1957	87.5	88.5	83.4	84.3	86.4	87.8	96.9	99.4
1958	81.4	82.1	77.1	77.6	80.9	82.4	89.7	91.9
1959	84.8	86.1	76.9	80.4	86.2	86.0	95.5	99.3
1960	79.9	83.2	76.7	80.2	75.8	77.2	93.9	99.7
1961	74.5	75.3	69.9	72.7	76.3	74.0	78.8	83.5
1962	82.1	85.2	79.1	83.1	80.0	79.7	91.7	98.8
1963	94.3	98.1	94.0	98.0	91.8	91.6	99.9	108.6
1964	92.1		93.2		88.6		97.6	
1965	107.3		106.7		109.2		104.3	
1966	117.3		122.7		116.0		110.5	
Manitoba								
1956	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1957	112.0	111.3	98.0	99.3	116.7	114.3	130.6	128.1
1958	83.8	82.6	75.6	74.8	71.3	75.7	106.6	100.4
1959	82.4	79.0	72.2	72.4	72.8	72.9	106.4	94.1
1960	87.4	92.5	77.9	78.8	74.1	79.8	113.1	124.2
1961	75.1	77.7	63.6	63.1	67.2	72.9	99.8	104.5
1962	81.2	83.5	71.2	72.9	69.5	75.4	106.2	106.9
1963	90.3	98.9	99.8	109.6	63.1	69.5	96.6	104.9
1964	92.9		93.5		82.6		100.1	
1965	100.2		102.1		84.3		109.6	
1966	114.9		117.9		96.4		124.6	
Saskatchewan								
1956	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1957	102.8	102.8	92.3	92.3	115.4	115.4	99.0	99.0
1958	79.7	79.7	71.8	71.8	85.9	85.9	84.8	84.8
1959	72.8	72.8	72.3	72.3	69.1	69.1	82.6	82.6
1960	69.1	69.1	77.0	77.0	56.0	56.0	79.7	79.7
1961	65.6	64.5	67.7	67.7	54.4	54.4	86.4	80.1
1962	64.5	62.9	66.9	66.9	55.9	55.9	78.8	69.5
1963	67.4	65.2	77.0	77.0	51.1	51.1	81.4	69.2
1964	76.6		82.7		65.1		88.3	
1965	94.7		99.8		87.9		98.0	
1966	110.2		116.5		103.5		110.5	
British Columbia								
1956	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1957	93.1	85.1	90.7	81.1	92.2	94.8	104.3	98.8
1958	78.4	77.2	74.2	72.5	76.9	87.5	97.8	94.9
1959	80.1	78.6	76.9	72.0	83.5	100.0	87.4	97.7
1960	79.8	80.1	74.1	74.0	85.0	102.7	94.4	95.5
1961	70.2	73.6	62.7	71.1	83.2	83.6	78.2	79.2
1962	66.9	60.1	66.4	56.1	65.3	66.7	71.4	76.5
1963	68.0	65.5	69.3	64.3	66.4	66.4	65.7	71.5
1964	74.5		70.3		84.6		74.1	
1965	89.7		90.2		89.4		88.0	
1966	91.0		89.4		93.0		94.3	

TABLE 2. Base-period Weights for Highway Construction Price Indexes Showing Original and Revised(1) Province Weights

	New-foundland	Nova Scotia	New Brunswick	Ontario	Manitoba	Saskatchewan	British Columbia	Federal Government
Revised(1)	8.0	9.6	7.7	36.8	8.1	8.3	21.5	
Original	3.3	5.9	5.9	41.3	7.7	5.2	19.6	11.1

(1) Revised weights were derived from a weighted average of provincial road expenditure for 1964 and 1965. Values have been corrected back to 1956 for price changes since 1956.

TABLE 3. Base-period Weights for Highway Construction Price Indexes Showing Original and Revised Major Group Weights for the Combined and Provincial Indexes

Major group weights											
	Grading			Granular base courses			Surface Courses			Total	
	Revised	Original	Deviation	Revised	Original	Deviation	Revised	Original	Deviation		
Combined	45.0	55.3	- 10.3	34.4	25.6	+ 8.8	20.6	19.1	+ 1.5	100.0	100.0
Newfoundland	51.5	51.5	0	26.9	26.9	0	21.6	21.6	0	100.0	100.0
Nova Scotia	40.6	40.6	0	30.2	30.2	0	29.2	29.2	0	100.0	100.0
New Brunswick	45.1	45.1	0	36.6	36.6	0	18.3	18.3	0	100.0	100.0
Ontario(1)	36.0	47.3	- 11.3	43.0	32.5	+ 10.5	21.0	20.2	+ .8	100.0	100.0
Manitoba	47.2	47.2	0	23.2	23.2	0	29.6	29.6	0	100.0	100.0
Saskatchewan	42.6	42.6	0	40.1	40.1	0	17.3	17.3	0	100.0	100.0
British Columbia(1)	59.8	75.2	- 15.4	25.7	10.5	+ 15.2	14.5	14.3	+ .2	100.0	100.0
Federal Government	-	76.0	-	-	13.3	-	-	10.7	-	-	100.0

(1) Revised weights were derived from provincial road expenditures for 1964. Values have been corrected back to 1956 for price change from 1956.

TABLE 4. Revised Base-period Item Weights for the Highway Construction Price Indexes, Combined and Provinces

	Combined	N'fld.	N.S.	N.B.	Ont.	Man.	Sask.	B.C.
per cent								
Grading	45.0	51.5	40.6	45.1	36.0	47.2	42.6	59.8
Clearing .....	.5	1.3	1.1	.5	.8	-	-	-
Grubbing .....	.6	1.4	1.2	.7	.8	-	-	-
Earth Excavation	28.1	28.9	23.3	24.3	18.6	40.2	40.4	37.9
Rock Excavation	9.4	14.0	8.7	13.6	4.9	-	-	21.4
Compaction .....	.9				2.4			
Drainage								
Placing	1.0	2.4	2.1	1.2	1.1	1.4	.6	-
Supply	3.9	3.5	4.2	4.8	5.8	5.6	1.6	.5
Concrete in Culverts								
Placing and Supply .....	.6				1.6			
Granular Base Courses	34.4	26.9	30.2	36.6	43.0	23.2	40.1	25.7
Pit-run gravels	10.8	-	11.9	7.1	18.4	-	-	11.0
Screened or Crushed gravels	21.7	26.9	18.3	11.2	23.2	23.2	40.1	14.7
Haul	1.4			18.3				
Compaction .....	.5				1.4			
Surface Courses	20.6	21.6	29.2	18.3	21.0	29.6	17.3	14.5
Placing Bituminous Hot-mix	14.4	15.8	21.9	13.4	16.1	11.7	12.4	9.9
Placing Portland Cement Concrete ...	.7					7.7		
Supply of Asphalt or Cement for Surface Courses	5.5	5.8	7.3	4.9	4.9	10.2	4.9	4.6
All-Items	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Highway Construction Price Index (REVISED)

EXCEPT FOR PRICES AND PRICE INDICES (ATIN# 62-002 DEC. 1967)

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